Intestinal Transplantation
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Intestinal transplantation is a solution for intestinal failure. There are 40,000 people on TPN due to small bowel disease. Success of transplantation has increased due to advances in immunosuppression. Intestines are lined with lymph nodes, which are prone to rejections. Intestines have bacteria leading to frequent infection (Williams, L., RN 2003).

Causes of Intestine Failure:

Structural Disease - gastroschisis, midgut volvulus, atresia, IBD and vascular events.
*Necrotizing Enterocolitis - Short bowel syndrome (noted in infants when they begin to feed.)
*Midgut volvulus - twisting.
*Gastroschisis - Herniation, evisceration, extrusion of other organs.
*Atresia/Stenosis - Congenital incomplete formation of bowel lumen.
*Crohn's Disease - Chronic transmural inflammation.
*Ischemic Lesions - Decrease in blood flow to small intestine, trauma, abdominal surgery, hematologic disorders.
*Familial adenomatous Polyposis / Gardner's syndrome (Williams, L., RN 2003).

Functional Disease - pseudo obstruction, entercyte abnormalities.
*Chronic intestinal pseudo-obstruction syndrome.
*Microvillus Inclusion Disease - autosomal recessive disease (seen in first days or weeks of life.)
*Megacolon/Hirschsprung disease - Congenital absence of intramural neural plexuses or aganglionosis. Prevalence in male children.
*Radiation enteritis - 2.4% to 25% of adults treated for pelvic or abdominal malignancy (Williams, L., RN 2003).

Indications for Intestinal Transplant
*Total dependence of TPN.
*Evidence of liver dysfunction.
*Recurrent life threatening line sepsis.
*Inability to place or difficulty finding (Williams, L., RN 2003).

Indications for Liver and Intestinal Transplant
*Intestinal failure.

*Biopsy proven liver cirrhosis or extensive bridging fibrosis.
*Remnant bowel functional (Williams, L., RN 2003).

Intestinal transplant survival is 50% for 5 years. 2/3 of all recipients are children, and the majority are less than 16 years of age. Medicare does not pay for intestinal transplants. Candidates for liver/bowel transplants are registered on liver transplant criteria (Williams, L., RN 2003).

Rejection:
*Surveillance biopsies (apoptosis).
*Radiologic monitoring (gastric emptying/transit time.) (Williams, L., RN 2003).

Prophylaxes Medications:
*Alprostadil 5-6 days.
*Pneumocystis (Bactrim, atovaquone, pentamidine) 1 year.
*Antiviral (Acyclovir, IVIG, ganciclovir) 1 year.
*Antifungal (Diflucan) 3 months.
*Vaccinations pre-transplant (Williams, L., RN 2003).

Morbidity: Related to Short Bowel Syndrome (SBS) - diarrhea, dehydration, hypocalcemia, hypomagnesemia, vitamin deficits, D-Iactic acidosis, calcium oxalate stones, metabolic bone disease, gastric acid hypersecretion. Related to TPN - Hyperglycemia, line sepsis, thrombosis, air embolus, catheter breakage, loss of venous access, hepatobiliary dysfunction (Williams, L., RN 2003).

Discharge Planning / Home health Care:
Parenteral nutrition, enteral feedings, IV fluids (electrolytes, antibiotics); Cytomegaly hyperimmune globulin, ostomy care, central line care; lab draws, feeding tube care, accurate intake and output, oral medication administration, physical therapy, education development, occupational therapy, scheduled intestinal biopsies, clinic visits (Williams, L., RN 2003).

Long Term Care:
Lab work, nutritional management (low fat, convert to age appropriate diet at 2-3 months, manage oral aversions, ostomy takedown 3-12 months).
Physician visits (Williams, L., RN 2003).

Cost:
Cost for isolated bowel- Median $181,484 ($129,275 - $460,536)
Cost for liver-bowel - Median $341,377 ($173,906 - $1,319,691)
(Williams, L., RN 2003).
Average Yearly Costs
Isolated intestine - $132,285.
Liver Intestine - $214,716.
Multivisceral- $219,098.
TPN - $150,000 (excluding the cost of equipment and nursing care).

(Williams, L., RN 2003).

Children make slow progress to catch-up in growth.
*65% take full oral diets.
*63% required developmental input.
*84% return to normal schooling.
*6% require supplemental parenteral nutrition.
*10% required IV fluid supplements (Williams, L., RN 2003).

Short-term survival is satisfactory, but long-term results are not known. Rejection is still a problem but it is improving. The costs and length of stay are still very high, particularly compared to other organ transplants (Williams, L., RN 2003).

The 2003 OPTN/SRTR Annual Report noted that the numbers of intestinal transplants remain small: 107 in 2002. The data presented do not distinguish between combined liver-small bowel transplantation and isolated small bowel transplantation. In the past five years, induction chemotherapy has become more common. The prevalence has risen from 41 % in 1998 to 57% in 2002. Rabbit antithymocyte globulin, basiliximab, and daclizumab were all used, without one agent establishing clinical predominance. (2003 OPTN/SRTR Annual Report.)

The 2003 OPTN/SRTR Annual Report states that tacrolimus was used in all recipients to the absolute exclusion of cyclosporine. This pattern has remained unchanged since 1996. Corticosteroids were also almost universal during this period, a pattern that has remained constant with minor variations since 1993. The use of other agents is much less consistent over time. No clear trend regarding antimetabolites was discernable, with wide shifts from year to year. While recognizing the limited data, it appears that mycophenolate mofetil, which peaked at 57% in 1996, had fallen out of favor and was administered to only 3% of cases in 2001. Rapamycin was recorded in 1999, 2000, and 2001 only. The frequency of its use has fluctuated widely. (2003 OPTN/SRTR Annual Report.)

The 2002 Milliman USA report noted that in 1999 the median waiting time for an intestinal transplant was 285 days. In 1999 there were 229 patients waiting for an intestinal transplant and of that 229, 44 died while waiting. Patient/graft survival rates in 2000 were 79% at one year, 62% at three years and 50% at five years. The cost for intestinal transplantation through the first year of follow-up, as outlined by Milliman, is as follows: Evaluation - $31,000; Procurement - $69,600; Hospital $593,500; Physician $55,100; Follow-up - $55,100; Immunosuppressants - $6,900.

Works Cited:
Milliman USA Consultants and Actuaries. 2002 Organ and Tissue Transplant Costs and Discussion. July 2002. www.milliman.com

OPTN/SRTR (US Organ Procurement and Transplant Network and Scientific

Registry of Transplant Recipients) Annual Report. Chapter 1- Organ Donation and Transplantation Trends in the United States, 2003. Chapter IV- Immunosuppression: Practice and Trends. www.optn.org/AR2003.

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